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IMPLEMENTATION OF FOREST-RELATED DECISIONS OF THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT AT THE NATIONAL AND INTERNATIONAL LEVELS, INCLUDING AN EXAMINATION OF SECTORAL AND CROSS-SECTORAL LINKAGES

Programme element I.5: Needs and requirements of countries with low forest cover

Report of the Secretary-General

SUMMARY

The present report focuses on the needs and requirements of countries or areas with low forest cover (LFCs). Several definitions of forest and low forest cover have been used; however, for the purposes of the report, the FAO global forest resource assessment data sets are used, namely 20 per cent minimum crown cover in developed countries and 10 per cent cover in developing countries.

While most definitions of low forest cover are based on land area and percentage canopy cover, the present report argues that the key issue is the scarcity of forest goods and services that are available to support sustainable development, so that area of forest per capita and security in the provision of forest goods and services are the key indicators.

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Nearly 75 per cent of the world's countries have less than one hectare of forest cover per inhabitant.

The factors that contribute to low forest cover are:

(a) Low original endowment;

(b) Historical deforestation;

(c) Current pressures on land use.

However, the relative importance of these factors varies both among countries and within countries.

FAO statistics show that forest loss in most of LFCs is low (less than 1 per cent). However, pressures are greatest on countries that have a low forest cover per capita, due primarily to the demand from a wide range of stakeholders for forest goods and services, such as fuel, fodder, timber, and in some cases agricultural land. In such instances, land tenure is also an important issue.

Unique forests are forests that provide a habitat for a significant number of species (centres of biological diversity), as well as forests that provide special goods and services to the communities that depend on them.

In general, the level of protection in the LFCs is low, with a mean of only 3.6 per cent, compared with a global mean of 6 per cent of forest. However, countries should make their own decisions and commitments on the areas to be protected.

In producing the present report, a shortage of information has been identified on the availability of forest-derived goods and services per person, both nationally and in global terms.

The information that is available is often deficient in terms of the topics covered, frequency, measurement of land area, quality and usefulness. While there have been several initiatives at the national and international levels to improve the collection, analysis and availability of information, there is perhaps a need for a more systematic approach, such as through forest resource assessment.

The challenge is to achieve security in forest goods and services for each person, each nation and the globe. The priority, therefore, should be for stakeholders to agree which goods and services are scarce and how to both improve and sustain their supply.

These issues can only effectively be addressed at the national level, where the options would seem to be:

(a) Developing and managing forests;

(b) Obtaining forest goods and services from agricultural and other non-forest land use;

(c) Importing forest goods and services from elsewhere;

(d) Identifying and promoting substitutes for them.

The selection and combination of options will inevitably vary with economic and social conditions and at the local, national and international levels. However, a key issue is ensuring access to up-to-date and relevant information on the current situation, the needs of stakeholders and options for the supply of forest goods and services.

The report suggests that countries may wish to consider setting up national mechanisms, such as forest/forest industry stakeholders' forums, to consider options, exchange information, generate new ideas, help identify and tackle cross-sectoral and other complex issues, and build a consensus for action.

In conclusion, the present report notes the diversity of LFCs and emphasizes that global solutions can only be derived from analyses, consensus and action that are formulated at the national level.

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* The maps will be made available to the Panel.

The boundaries shown on the maps do not imply official endorsement or acceptance by the United Nations.

INTRODUCTION

1. The present report covers element I.5, "Needs and requirements of countries with low forest cover", of the programme of work of the Ad Hoc Intergovernmental Panel on Forests.

2. The preparation of the report was guided by decisions taken by the Commission on Sustainable Development at its third session and further elaborated by the Panel at its first session.

3. The Commission defined programme element I.5 as a need to propose measures for addressing the needs and requirements of developing countries and other countries with low forest cover in order to promote activities to conserve existing forest cover, with particular attention to unique forests.

4. At its first session, the Panel emphasized the need to prepare a report on the specific needs of countries with low forest cover, particularly developing countries and other countries with low forest cover, in order to promote activities to conserve existing forest cover, with particular attention to unique forests. The report should consider particular situations in which communities and forest dwellers depend on forests to meet their subsistence needs, such as fuel, food, forage, grazing provisions for livestock, shelter and medicinal plants, and should also identify areas of low forest cover, protected forests and dry woodlands.

5. The present report was prepared by the United Nations Environment Programme, as lead agency for programme element I.5, in consultation with the Panel secretariat in the Division for Sustainable Development of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat. The report is based on a study prepared by the Overseas Development Agency of the Government of the United Kingdom of Great Britain and Northern Ireland.

6. The report focuses on the needs and requirements of countries or areas with low forest cover (LFCs), including developed and developing countries. The report considers what is meant by low forest cover in terms of the scarcity of the goods and services provided by forests, explores the reasons for low forest coverage, and attempts to identify LFCs based on current global statistics; presents an overview of the current status of forest resources and values in LFCs; and identifies gaps in the information available and some options for promoting the security of forest goods and services within LFCs.

I. LOW FOREST COVER

A. Definition of the term "forest"

7. The term "forest" encompasses an enormous range of natural and man-made ecosystems that may differ in almost all their characteristics, save that they consist primarily of trees. A major problem in defining a forest is how to determine the threshold at which tree cover becomes sufficiently dense to

constitute a forest rather than, say, open woodland. A number of vegetation classification systems distinguish forests from other woody formations by applying such thresholds (see box 1).

Box 1. Definitions of forest cover

UNESCO	Closed forest	Trees greater than or equal to 5 metres tall, with crowns interlocking
	Woodland	Trees greater than or equal to 5 metres tall, with crowns not usually touching but with canopy cover greater than or equal to 40 per cent
United States classification	Closed tree canopy	Trees with crowns interlocking, with crowns forming 60 to 100 per cent cover
	Open tree canopy	Trees with crowns not usually touching forming 10 or 25 to 60 per cent cover
FAO	Forest (developing countries)	Ten per cent crown cover of trees and/or bamboos
	Forest (developed countries)	Tree crown cover (stand density) of more than 20 per cent of the area
	Other wooded land (developing countries)	Includes forest fallow, shrubs
	Other wooded land (developed countries)	Includes open woodland (tree crown cover 5 to 20 per cent), scrub, brushland, exploitable forest
	Closed forest (tropical countries)	Tree crown cover greater than 40 per cent

8. The scarcity of forest products (wood and non-wood, commercial and non-commercial) and forest services may be felt most keenly in forest-poor countries, especially developing countries; such is the source of concern about low forest cover: in many developing countries, an increasing number of people rely for their daily subsistence on overutilized forest resources that are dwindling at an alarming rate.

9. The scarcity of forest goods and services must be assessed on various scales, since different goods or services are important at different levels in society (e.g., individual, national and global). However, no integrated data on

forest goods and services are widely available. As a result, for the purposes of the present report it has been necessary to estimate data based on forest cover, even though forest cover may not accurately reflect the availability of forest goods and services because in many cases these may be provided by other land covers, and forest cover does not reflect the accessibility of such goods and services since this might be affected by issues of forest ownership or land tenure. However, the datasets contained in the global forest resource assessment of the Food and Agriculture Organization of the United Nations (FAO), do provide the most standardized basis available on which to assess the forest resources of individual countries.

B. Countries with low forest cover

10. The extent of forest area is strongly influenced by the definition used: a low threshold for canopy cover can result in the inclusion of woody vegetation not normally regarded as forest (see box 2).

Box 2. Sample effects of using different forest definitions

Senegal is 40 per cent forested using the FAO 10 per cent tree cover definition, which includes dry woodland, but it is only 2 per cent covered by closed forest.

Australia is 5 per cent forested according to the FAO 20 per cent tree cover threshold but it is only 0.4 per cent covered by dense forest (with greater than 70 per cent canopy cover).

11. The analyses in the present report are based on FAO forest definitions of a minimum crown cover of 20 per cent in the developed countries and 10 per cent in the developing ones. Although they are not truly comparable across the globe, these statistics are the only ones available for all forested countries.

12. For any given definition of forest, national forest cover can be assessed in terms of the percentage of area covered, area of forest cover per capita or proportion of world forest resources contained within the country, among other measures. Which assessment of cover is most useful will depend on the purpose of the assessment; for example, where the concern is land cover and the services that are provided by forests as land cover, such as soil and watershed protection, habitat or carbon storage, forest cover as a percentage of total land area is the measure of interest.

(a) Of the countries or areas covered in the FAO forest resource assessment, more than 25 per cent have less than 7 per cent of their land under forest cover, and 50 per cent are less than 25 per cent forested (see figure 1a);

(b) If other wooded land is included, the 45 LFCs have less than 19 per cent of their land area under woody cover, and 50 per cent of LFCs are less than 40 per cent forested in this broader sense (see figure 1b and map 1).

13. The ability of a nation's forests to supply goods and services to its inhabitants may be better assessed in terms of forest cover per capita. For example:

(a) Nearly three quarters of the world's countries have less than one hectare (ha) of forest cover per inhabitant (see figure 1c). Approximately 25 per cent of the countries or areas covered by the FAO forest resource assessment (FAO, 1995) have less than 0.07 ha of forest per capita, and 50 per cent have less than 0.25 ha per capita (see map 2);

(b) The inclusion of other wooded land vastly increases the area of forest cover per capita in some countries, though not in others, with 58 countries or areas having less than 2 ha of forest and other wooded land per capita.

14. The 25 per cent of countries or areas included in the FAO forest resource assessment (FAO, 1995) that have the least forest cover according to each of these criteria are listed in the table in order of forest cover. Many countries or areas fall into the least forested group based on all three criteria mentioned in paragraph 12 above, although some do appear under only one or two criteria. Comparison between the columns in the table highlights the differences among LFCs. For example, countries that have small areas of forest cover but also small populations, such as Afghanistan, LFCs are based on forest cover but not based on forest per capita. Similarly, countries that have relatively large areas of woody scrub and other wooded land, such as Australia and Kenya, are LFCs based on forest cover but not based on forest cover and other wooded land.

C. Factors contributing to low forest cover

Low original endowment

15. Many of the LFCs listed in the table are located in the arid regions of the world, which are climatically unsuited to support forest cover (see map 3). In these countries, what forests there are may be restricted to pockets of more favourable growing conditions, such as fog-bound mountain tops or oasis areas with high water tables. Polar conditions also restrict original forest cover for a few countries, such as Iceland.

Table. Countries or areas with least forest cover, based on area under forest cover, area under forest and other wooded cover, area of forest per capita

	LFC based on				LFC based on		
Country or area	Area under forest (canopy greater than 10 per cent)	Area under forest or other wooded cover	Area of forest per capita	Country or area	Area under forest (canopy greater than 10 per cent)	Area under forest or other wooded cover	Area of forest per capita
American Samoa	*	*	*	Afghanistan	*	*	
Bahrain	*	*	*	Niger	*	*	
Barbados	*	*	*	Kenya	*		*
Bermuda	*		*	Pakistan	*	*	*
Cayman Islands	*		*	Saint Helena	*		
French Polynesia	*		*	Tunisia	*	*	
Guam	*	*	*	Cape Verde	*		*
Iceland	*	*	*	Uruguay	*	*	
Kiribati	*	*	*	Comoros	*	*	*
Netherlands Antilles	*	*	*	Israel	*	*	*
Niue	*		*	Australia	*		
Oman	*	*	*	Morocco	*	*	
Pacific Islands	*		*	Ireland	*	*	
Qatar	*	*	*	Mauritius	*		*
Saint Pierre et Miquelon	*	*	*	Mongolia	*		
Tonga	*	*	*	El Salvador	*		*
Yemen	*	*	*	Singapore		*	*
Egypt	*	*	*	Bangladesh		*	*
Saudi Arabia	*	*	*	Netherlands		*	*
Iraq	*	*	*	Lebanon		*	*
Libyan Arab Jamahiriya	*	*		Saint Lucia			*
Lesotho	*	*	*	Rwanda			*
Kuwait	*	*	*	United Kingdom		*	*
Mauritania	*	*		Seychelles		*	*
Jordan	*	*	*	Burundi			*
United Arab Emirates	*	*	*	Belgium			
Algeria	*	*		Swaziland		*	
Djibouti	*		*	Denmark		*	
Iran	*	*	*	Ukraine		*	
Haiti	*	*		China		*	
Somalia	*			Hungary		*	
Syrian Arab Republic	*	*		Bahamas		*	
				Argentina		*	

Note: Countries and areas are listed in order of increasing forest cover.

Deforestation in the past

16. Many LFCs were deforested by exploitation before the twentieth century: the fate of their forests depended upon a combination of factors related to climate, location and control, as well as on demands for agricultural lands and forest products, which in turn were related to population trends and institutional controls. The forests of the United Kingdom and of Ireland underwent a phase of depletion during the seventeenth to nineteenth centuries, when they were used to supply the shipbuilding industry. The Mediterranean region was severely deforested during classical times by the exploitation of fuel and timber. War and instability have also been blamed for the decline of forests: Lebanon lost 60 per cent of its forests in the first three years of the First World War.

Current pressures on land use

17. A few LFCs once had a substantial endowment of original forest that has been depleted more recently by exploitation and demands for conversion to other land uses (see E/CN.17/IPF/1996/2). This is particularly true of countries in which the total land area per capita is relatively restricted so that the possibilities of expanding onto non-forested land are reduced. Islands are a classic example: there the scope for expansion and exploitation of alternative sources of forest goods and services is absolutely restricted; 23 of the 65 countries or areas listed in the table are islands.

II. CURRENT TRENDS

18. FAO records deforestation rates of zero for most of the LFCs listed in the table, with an average loss of natural forest of less than 1 per cent for those LFCs for which data is available. These low rates of forest clearance may reflect several factors, such as:

(a) FAO does not record forest clearance in LFCs whose area of forest cover falls below the minimum threshold;

(b) LFCs probably value their forests highly;

(c) Remnant forests are often very well protected, either legally or by their location in areas that are inaccessible or otherwise undesirable for other land use.

19. The pressures on remaining forests, however, may be quite intense, especially in countries with low forest cover per capita. In Pakistan, annual growth in the 1980s accounted for only 62 per cent of the annual wood harvest (Biswas, 1987, cited in Mather, 1990). Demands for fuel and fodder are especially intense in such areas and may be less easily controlled by legal instruments due to problems of accessibility.

20. Some LFCs have actually been increasing their forest cover in recent years through reforestation and afforestation programmes, and LFCs had an average net increase of 0.3 per cent in natural and plantation forest area over the

1980-1990 period, compared with a net forest loss worldwide of between 0.1 and 0.2 per cent. In general, LFCs have a greater percentage of their forest resource in plantation (24 per cent vs 10 per cent for the world). Plantations can improve the availability of forest goods and services, but since they are frequently monocultures of exotic species they may make little or no contribution to protecting indigenous biological diversity.

21. In the past, the main focus for discussions on forest conservation has been on countries with relatively high forest cover. Increasingly, the importance of forest management in LFCs has been recognized: a number of LFCs have developed national forestry action programmes and most have ratified the Convention on Biological Diversity. Few of them, however, have produced national biodiversity action plans.

A. Goods and services

22. As already discussed, forests provide a wide range of goods and services (see box 3); in LFCs, a high proportion of such goods and services are likely to derive from other wooded land, farmland or plantations.

23. LFCs with low forest cover as a percentage of their total land area are generally net importers of timber or timber products. El Salvador, for example, imports 80 per cent of the annual requirement of its wood-based industries (250,000 cubic metres (m^3)) from other Central American countries. Kenya has banned the export of unprocessed indigenous hardwood timbers since 1983, and imports hardwood.

24. LFCs may export small quantities of speciality timbers from species, such as Dalbergia spp and Diospyros spp, but it is difficult to obtain information on levels of trade.

25. Wood is the major energy source in many countries, including LFCs. For example, it has been estimated that fuelwood from trees and shrubs accounts for over 60 per cent of Lesotho's energy requirements. In El Salvador, the annual consumption of forest products for energy production is estimated at 4.9 million m^3. And the predominant use of wood in Haiti is for fuel, with 75 per cent of the country's energy consumption provided by biomass. Acute fuelwood scarcity is a major global problem and is of particular concern in LFCs.

26. In addition to roundwood and fuelwood, forests and woodlands contribute very significantly to local and national economies through non-wood forest products (NWFPs). These are particularly important to the people living in and around the forests, but since this process is an informal and often a barter system it is difficult to record and is not generally reflected in national statistics. NWFPs may be highly significant commercial resources in local economies or may be export commodities from LFCs.

27. In LFCs, forests may be important sources of foodstuffs, both for local consumption and for export. They also play important roles in protecting the genetic resources of important crop species.

Box 3. National importance of wood resources and other forest products

In Kenya, more than 75 per cent of the energy used comes from fuelwood and charcoal. The contribution to the economy of fuelwood and other forest products, such as honey, gum, food, medicine and leaves, has not been assessed, but such products undoubtedly add to the importance of Kenya's forest resources. Timber is one of the most important products derived from Kenya's forests. Current demand for indigenous timber, however, far exceeds its legal available supply.

Although Somalia has a very low percentage of forest cover, over 50 per cent of the country has tree cover generally in the form of open savanna. Important uses of trees include for fuelwood, hut construction, livestock enclosures and fodder. It has been estimated that forests contribute about 6 per cent of Somalia's gross domestic product (GDP). This figure would be substantially higher if the products and services provided by trees to other sectors of Somalia's economy, such as water-resource maintenance, the provision of fodder, fuelwood and edible products, were taken into account.

Barbados has 2 per cent of its land area under some form of tree cover. Tree harvesting for industrial purposes is undertaken by one company integrated directly with the furniture industry. Harvesting consists of the selective removal of native mahogany trees. There are 57 companies on the island involved in the manufacture of wooden products, which contributed some US$ 4.2 million to GDP and 5 per cent of employment in the manufacturing sector in 1989. A significant handicraft industry also uses wood and non-wood products.

Pakistan's limited forest resources fall into two categories: production forests (27.6 per cent), which are potentially for timber extraction, and protection forests (72.4 per cent), the main function of which is to protect soil and water resources. Irrigated plantations cover nearly 0.23 million ha in the plains of Pakistan. Established over 100 years ago, they are managed for fuelwood and timber for furniture and wood-based industries. Farmland produces more timber than forest reserves.

Sources: FAO; Marshall and Jenkins (1994); IIED (1992).

B. Unique forests

28. Unique forest ecosystems are especially important for biodiversity conservation. They may be areas with significant numbers of unique (that is endemic) species, or they may be areas with unique communities or associations of non-endemic species. Generally, more information is available on the occurrence of endemic species than on unique communities. Two global-level measures of endemism that give a good indication of important areas and unique ecosystems are endemic bird areas and centres of plant diversity.

29. The occurrence of endemic bird areas (EBAs) - areas that contain at least two bird species whose whole range is less than 50,000 square kilometres (km^2) - (Bibby and others, 1992) may serve as an alternative way to identify areas with unique ecosystems that have notable numbers of endemic species. EBAs have been roughly categorized into different habitat types. Some 21 EBAs with forest (either all forest or mixed) occur in LFCs, of which 15 are entirely confined to LFCs. These EBAs particularly the 11 given priority-one rating by BirdLife International in their analysis of EBAs (Bibby and others, 1992), can be considered likely to include a high proportion of the major conservation priorities among forest areas in LFCs.

30. The World Wide Fund for Nature (WWF) and The International Union for the Conservation of Nature (IUCN) are in the process of completing a major project to identify global centres of plant diversity (WWF and IUCN, 1994). Some 234 sites have been chosen worldwide for data-sheet treatment, although a large number of other areas also meet the selection criteria. Of the sites chosen, 28 are wholly or partially within the 49 LFCs, although at least three of these are non-forest sites. Ten of the 28 sites are in Australia and seven in the Middle East, the latter being an area with no EBAs. However, a notable number of LFCs in the Pacific and Caribbean regions are included in the regions that meet the criteria for a centre of plant diversity but do not have data sheets.

31. Unique or rare forest ecosystems that are not comprised of significant numbers of endemic species are more likely to be found in areas that previously had more continuous forest cover but in which forest cover has been fragmented and reduced relatively recently (in evolutionary terms) by climatic change, human influence or a combination of the two.

32. Two distinct factors need to be considered in assessing the uniqueness of forests: the contribution that they make to global biological diversity and the contribution that they make to national biological diversity. There is no obvious relationship between the extent of forest cover and the importance of the forests for biological diversity.

33. In broad terms, the importance of an area for biological diversity in the sense of species diversity is a reflection of both species richness and endemism. The former is simply the number of species occurring there, the latter is the number of species restricted to the area. In addition, for conservation planning, the number of threatened species in an area is also important.

34. The World Conservation Monitoring Centre (WCMC) has examined species richness and endemism in each country larger than 1000 km^2. In general, LFCs have lower than average biodiversity, which is to be expected in view of the widely recognized overall correlation between forests and terrestrial biodiversity. More particularly, only one out of what are probably the 20 most important countries in the world for biological diversity (Australia) is represented among the 49 LFCs.

35. However, this reveals relatively little about the importance of the forests themselves; for example, much of Australia's biological diversity lies outside forest ecosystems. It is possible that forest areas within a given LFC may be of global importance for biological diversity; unfortunately, data is often lacking on rates of species richness and endemism in different habitats within countries. In general, their importance - if any - is expected to lie in their endemism more than in their species richness, because LFCs have small absolute areas of forest and species richness is strongly correlated with area of habitat, so that it would be expected to be lower than average in LFCs. However, the fragmented and often isolated nature of forest cover in LFCs, where it is long-standing in evolutionary terms, such as on islands or in climatically isolated areas, may lead to greater than average levels of endemism. Climate and isolation are key factors in determining biodiversity in LFCs, and their increasing importance for endemism and species richness through isolation by deforestation is illustrated in box 4.

Box 4. Factors affecting biodiversity complements in LFCs

Climate

Terrestrial biodiversity is generally higher in tropical than in temperate or polar regions; it is also higher in wetter than in drier areas. Countries in the humid tropics are therefore generally the most diverse, particularly their forest ecosystems. Humid regions - both tropical and non-tropical - are also generally the most heavily forested.

Of the 49 LFCs, 12 are wholly or partially within the humid tropics and generally hold the forest with the highest diversity among LFCs; 9 of then are islands and the three remaining continental countries are Kenya, Australia and El Salvador.

Islands

Other things being equal, islands have lower species richness but higher species diversity than comparable continental areas. Thus, since more LFCs than would be statistically expected are islands, endemism in LFC forests is higher than average.

Relict forests

Several biologically important areas of forests have been reduced by deforestation to small remnants of formerly extensive forests. The coastal forests of Kenya and Tanzania once extended in an unbroken line from the Somali border in the north almost as far as Mozambique in the south. They were the home of a unique collection of animals and are recognized as an endemic bird area, with eight species of endemic birds. Human pressure and conversion to agricultural land have now reduced them to a small number of remnant forest patches, such as the Sokoke Forest of Kenya. Although some species are now extinct, a few - such as the Sokoke Scops Owl and Clarke's Weaver - maintain a precarious existence concentrated into these last forest patches. A similar pattern can be observed in the coastal forests of Brazil.

C. Protected areas

36. The internationally accepted definition of a protected area is given as an area of land and/or sea that is especially dedicated to the protection and maintenance of biological diversity, as well as of natural and associated cultural resources, and that is managed through legal or other effective means.

37. In practice, the purpose for which sites are managed differ greatly, and may range from scientific research and tourism and recreation to the sustainable use of resources from natural ecosystems. IUCN has developed a system of broad categories that classify protected areas in terms of their overriding management objectives (IUCN, 1994). The analyses presented in the present report include

only protected areas classified as IUCN management categories I through V; multiple-use areas, such as some forest reserves, have been excluded. There is evidence, however, that this approach can lead to a significant underestimation of the total protected areas estate (WCMC, 1992). Some relevant facts are:

(a) In general, the level of protection in the world's LFCs is low, with a mean of 3.6 per cent compared to a global mean of more than 6 per cent protected area;

(b) Some 36 of the 49 LFCs have a protected areas network that is smaller than the global mean, and only 11 countries or areas are above average in this respect;

(c) Data for a number of countries or areas with larger than average protected area networks, such as Australia, American Samoa, the Cayman Islands, Kiribati and Bermuda, may include large marine protected areas, such as the 34,000 km^2 Great Barrier Reef Marine Park, a consideration that could inflate the calculations of protection based on land area;

(d) Of the 10 countries or areas with less than 0.15 per cent of their land area protected, six are in North Africa and the Middle East. In general, countries in this region have yet to develop comprehensive protected areas networks, the exception being Israel at 16 per cent cover. IUCN is currently developing with government agencies a regional action plan to encourage the establishment of more protected areas in this region (Dean, 1995).

38. Such simple statistics as those mentioned above do not explain the relationship between the distribution of protected areas and forests or other habitat types. Guidelines developed by IUCN (IUCN, 1993) suggest that Governments should aim to protect at least 10 per cent of each biome within their national territory. In the case of countries that have converted substantial areas of forest, 10 per cent of the biome may constitute both a large total area and a high proportion of the remaining forest extent. In contrast, those parts of the world that have never supported significant forest area will be able to achieve the 10 per cent target relatively easily. For example, forests cover less than 0.1 per cent of Saudi Arabia, the entire extent of which could be easily accommodated in even the relatively modest 2.6 per cent of protected area.

39. A number of studies have been carried out to assess the proportion of forest under protection. One overview of protected major ecofloristic zones (EFZ) in the tropics (Murray and others, 1995) indicates that 8.8 per cent of moist tropical forests are protected compared to 7.7 per cent of all original vegetation types. The more extensive protection of moist tropical forests suggests that the strategy to protect high biodiversity habitats is proving to be successful.

40. With respect to conservation of major EFZs, moist zones are better represented in protected areas than dry zones. While the priority given to moist zones may be justifiable in terms of biodiversity conservation, Murray and others (1995) demonstrate the need to increase protected area coverage in drier zones, which predominate in LFCs.

41. It is generally true that stands of forest in LFCs will be small and fragmented, which has important implications for the design and management of protected areas. The long-term effectiveness of protected areas is determined to a considerable extent by edge effects, especially with respect to conversion, poaching and other threats. Larger sites will have a more favourable perimeter-to-area ratio and will be more robust as effective conservation areas. In the case of smaller protected areas, a greater emphasis should be placed upon the development of buffer zones that will deflect pressures away from protected areas without attracting additional settlement and encroachment.

42. The conservation role that protected areas play in LFCs depends to a large degree on the origin of their low forest cover: if forest has been lost relatively recently due to development pressures, remaining habitat fragments will have an exceptional value as refuges for species that were previously widely distributed. Conversely, arid lands that have not supported extensive forests for long periods of time are unlikely to be any more significant in terms of their biodiversity than other habitats found in the region. In the former case, preference should be given to establishing protected areas in remaining forested areas; in the latter, a more even distribution will be required to ensure the representation of arid-land ecosystems and species.

III. INFORMATION REQUIREMENTS

43. As discussed above, the principal issue under consideration for LFCs is the availability of forest-derived goods and services per person, nationally and in global terms. The information needed to arrive at an understanding of the scarcity of such goods and services is lacking at the global level, and may or may not be available at the national and local levels.

44. This is largely because the information systems normally in use are inadequate in a number of ways, as follows:

(a) Topics: the scope of information is too restricted and thus fails to track forest values in terms of the full range of goods and services provided. For example, the use of NWFPs is not often monitored and the dependence of rural communities on them is poorly documented. The service roles of forests, such as for biodiversity protection and carbon sequestration, are rarely covered;

(b) Frequency: the regularity with which information is updated is inadequate so that decision-making is not based on current status and trends;

(c) Land area: information coverage is too restricted. For example, land cover types other than forest that can be sources of forest goods and services are not often included, and minimum-area thresholds mean that small but important forest resources may be excluded;

(d) Quality: information quality is inadequate in terms of its accuracy and comparability. For example, differences in definitions and thresholds for forest cover prevent comparison between countries and often within them as well;

(e) Use: the process of information gathering is not integrated with the purposes for which the information is being gathered.

45. A number of recent developments from the global to the local levels are improving the quality of the information that is available in several ways. For example, the wider use of participatory methodologies is improving the degree to which information on forest goods and services incorporates the perspectives of local stakeholders. Global programmes for the remote sensing of forest resources and increasing the possibilities for incorporating assessments of land cover other than forests that might provide forest goods and services. National monitoring programmes are increasingly being implemented to improve the accuracy of data and the frequency with which they are recorded. And systems approaches, such as forest resource accounting (IIED and WCMC, 1994), are increasingly matching information gathered to the needs of policy makers and other information users.

46. In many cases, new information is needed for developing policies that are appropriate to the management of scarce forest resources, analysing the markets for forest goods and services, determining institutional responsibilities and roles, and planning forest management. The information needed is very diverse, and cross-sectoral information systems are needed to integrate such information into a common context. Information capacities should be integrated with and driven by the forest management and policy processes, and should not function as separate activities. Forest resource accounting (FRA) can meet these needs: it offers a common basis for comparing values and setting priorities, combining information (generally collected in the course of routine management) on forest condition, use, management status, area, legal status and ownership. FRA can also provide much of the information required for the economic valuation of disparate forest goods and services.

IV. APPROACHES AND POLICY OPTIONS

A. Options

47. The security of supply of forest goods and services is likely to be of importance in different ways at local, national and global levels. Mechanisms to evaluate its importance and to ensure the long-term security of supply will require appropriate policies, institutions and information flows.

48. A suggested process for ensuring that full consideration is given to forest security is illustrated in figure 2, based on Upton and Bass (1995). The process is participatory and iterative, and emphasizes the need for continuous improvement. It recognizes that information is currently incomplete, capacities need to be built up, adaptive approaches need to be tried and priorities will change over time.

49. The process accommodates four options for securing forest goods and services:

(a) Developing and managing forests on the basis of a permanent forest estate;

(b) Obtaining forest goods and services from agricultural and other non-forest lands;

(c) Importing these goods and services from elsewhere;

(d) Promoting substitutes for them.

50. Each option has different implications at the local, national and international levels; given the great diversity of situations among LFCs, such implications will vary from country to country. In practice, most countries will balance these various options rather than emphasize only one.

1. Permanent forest estate

51. This option includes:

(a) Forests and woodlands under all types of ownership;

(b) Protection, production and mixed-use categories.

52. The process of developing a permanent forest estate (PFE) identifies the types of forest that are needed to meet demands for forest goods and services now and in the foreseeable future. It matches them with the spectrum of available forests and plantable land under all kinds of ownership, thus linking forest values to specific forest types. It helps to clarify where investment is needed and who should be responsible. Incentives can then be set to promote the sustainable production of goods and services by appropriate groups.

53. Where the required PFE is bigger than the current forest area, afforestation may be indicated (this is common in LFCs). Conversely, where forest area is (locally) larger than the PFE, planned forest conversion may be permitted (rare in LFCs).

54. Food security depends largely on the protection that forests give to water and soils. Many LFCs have lost much forest cover and are suffering some food security problems as a result. Hence, national programmes for food security will require ensuring a level of forest security. Furthermore, national needs for fibre supplies in times of war and disaster may require at least a strategic minimum of PFE.

55. In some circumstances, local interest may favour the production of non-market benefits (recreation, aesthetic values) and subsistence food, fibre and fuel that may be locally non-substitutable. The challenge is to integrate interests, if this is possible and in agreeing on trade-offs between them if it is not.

56. Considerable afforestation will be needed to meet increasing global fibre demands, especially for pulp and paper. For environmental reasons, such afforestation will often be established on non-forested and degraded lands, which are widely available in many LFCs. Where commercial afforestation to meet such demands is envisaged, private-sector financial consortia may be able to

spread risks across different investments and countries. Governmental and intergovernmental assistance for covering the incremental social and environmental costs of achieving good forest stewardship in such plantations may be warranted, and joint implementation schemes for carbon offset, in which markets are now developing, may increase the attractiveness of afforestation on a large scale.

57. LFCs may find it necessary to make all forest management and conservation more information-intensive throughout PFEs (for discussion of improved information capacities, see section III above). However, in many LFCs a practical limit on PFE development may be set by the availability of skills and support structures. The Panel's programme of work includes consideration of the role of international instruments, such as the conventions on climate change, biodiversity and desertification conventions, in both establishing national action plans and coordinating international support for building the capacity to undertake such actions (programme element V.1).

2. Forest goods and services from non-forest lands

58. This option includes goods and services from farmlands, agroforestry, pastoral lands and urban forests.

59. In many countries, non-forest land is as significant as forests for producing fuelwood and fibre, as well as some tree-related biodiversity. Indeed, tree resources on non-forest land can be highly valuable, having been planted or maintained there for specific values. However, forest and other land-use institutions and policies do not generally reflect this reality, so that trees on farms may be invisible to forest authorities.

60. Some LFCs could decide to base the policy and production of forest goods and services on non-forest land, which may mean that production is spread among lands of very different ownerships, for which many different government authorities have mandates. This would entail changes in mandates and responsibilities, the introduction of partnership mechanisms and coherent incentives for operating in different sectors, and improved forestry capacity in authorities dealing with non-forest land. A forest coordinating and advisory service may be needed.

3. Importing forest goods and services

61. This option includes:

(a) Importing timber, pulp or recycled paper;

(b) Paying other countries for carbon sequestration and biodiversity protection, i.e., substituting for local forests.

62. Two issues are at stake here: the substitutability of specific forests, and the ecological and social impacts of imports on exporting countries. Substitutability is contentious and is discussed below. In choosing not to

maintain or develop its own forests, an importing country shifts the burden of the social and environmental costs of production on other countries; it should therefore be aware of such costs.

4. Substitutes for forest goods and services

63. This option includes producing or importing such goods as mineral energy for fuelwood or concrete, plastics and metal for timber.

64. The substitutability of a specific forest good or service is a major issue. Some environmental and social goods and services may either have no substitutes, or such substitutes would be very expensive locally. Life-cycle analysis may be able to compare the environmental impacts of non-forest goods with forest goods.

65. In addition, the substitution of one good or service may affect the production of others. For example, a decision to import all pulp and paper may reduce markets for local thinnings in timber production; if this results in a complete lack of incentives to maintain forests for all other goods and services, substitution may not be appropriate.

* * *

66. For all four options, an additional need is to reduce waste and increase the efficiency of production and consumption, which is particularly important for LFCs facing scarcities. The issue of patterns of production and consumption may be considered in the proposed Norwegian initiative for a study on the theme "Long-term trends and prospects in supply and demand for wood products, and possible implications for sustainable forest management".

B. Criteria for selecting and balancing options

67. Policy decisions about the security of forest goods and services need to be made at the national level. Most countries will select more than one option, and the key issue is to find the right balance. Information needs for assisting such decisions have been outlined; in many LFCs, however, information capabilities may never be ideal and strategic decisions may have to made in a climate of heightened uncertainty and multiple stakeholder demands. Balance also ultimately needs to be achieved at the global and local levels; for example, not all countries can depend upon imports. Achieving balance can be guided by information on forest assets, their economic values, the degree of substitutability of forest products, and an assessment of risk and uncertainty: hence the importance of collecting and sharing information.

68. Substitutability concerns the environmental, social, cultural and economic unique of forests. The first two considerations are contentious, although there are scientific guidelines for biodiversity such as the IUCN guidelines, as well as for natural and cultural heritages. More research is needed on how far forest security is essential for providing the environmental services that are required for food security. The Panel may wish to discuss further ways in which countries can define uniqueness.

69. Uncertainty is increasing, notably in market conditions and as a result of possible climate change. Climate change may mean that forested watershed will increase in its importance for food security and water supplies. Conversely, existing forests in LFCs may become ecologically inviable, particularly as they are often at the extremes of forest viability already. Obviously, adopting only one option is risky, and a balance of options reduces risk.

70. Mechanisms for consultation and debate among stakeholders will facilitate the process of choosing and balancing options. An appropriate forum, such as a forest/forest industry stakeholders' forum could combine scientific information with stakeholder perspectives at the local, national and global levels. Such a forum would improve information flow and the generation of new ideas, and would help to tackle cross-sectoral issues, providing the potential to develop options on the basis of partnership and setting the stage for subsequent decisions.

71. In making such decisions, the principle of subsidiarity, under which decisions are first made at the level at which the scarcity of the good or service most strongly affects welfare, may be helpful. For example, the scarcity of unique forest biodiversity could be considered at regional and global levels, the scarcity of construction timber at the national level and the scarcity of firewood at the local level.

72. Criteria for stakeholders to select and balance options include:

(a) Economic criteria:

(i) Existing forest values and comparative advantage;

(ii) Cost effectiveness of producing good or service;

(iii) Price/market trends;

(b) Social and environmental criteria:

(i) Substitutability or uniqueness of forest for producing the good or service;

(ii) Environmental impacts;

(iii) Social impacts;

(iv) Equity among stakeholders and generations;

(c) Political, institutional and other contexts:

(i) Strategic/military/food security requirements;

(ii) Historical, cultural and other precedents.

V. CONCLUSIONS AND PRELIMINARY PROPOSALS FOR ACTION

A. Conclusions

73. Many countries, of diverse types, have low forest cover. Such countries produce few forest goods and services and often depend greatly on other countries, most obviously for wood and fibre but also for other goods and services. This has implications for the production of goods and services at the global level: the scarcity of forest goods and services is a global problem, and the improvement of forest security should be a priority concern for sustainable development.

74. On balance, the essential nature and limited degree of substitutability of some forest goods and services - notably for food security, water supplies and biodiversity - and the many uncertainties and lack of information in this area, may lead even countries with very low forest cover to consider it prudent to invest in at least a minimum PFE. This may entail considerable rehabilitation efforts and the protection of unique forests.

B. Preliminary proposals for action

75. The Panel may wish to consider the following areas for priority attention as regards LFCs:

(a) Forest goods and services:

(i) The availability of forest-derived goods and services per person both nationally and in global terms, as well as how that availability affects LFCs;

(ii) The widespread problem of acute fuelwood scarcity, which is of particular concern to developing LFCs;

(iii) The proper valuation of non-wood forest products, and recording and reflection of these in both national statistics and global analyses;

(iv) The need for policies and institutions to reflect the significance and value of non-forest land for producing fuelwood and fibre, and for ensuring tree-related biodiversity;

(b) Protected areas and biodiversity:

(i) In the case of smaller protected areas, placing greater emphasis on the development of buffer zones, that could deflect pressures away from protected areas without attracting additional settlement and encroachment;

(ii) If forest has been lost relatively recently due to development pressures and remaining habitat fragments have an exceptional value as refuges for species that were previously widely distributed, giving

preference to the establishment of protected areas in remaining forested areas;

(iii) In the case of arid lands that have not supported extensive forests for long periods of time, creating evenly distributed protected areas to ensure the representation of arid-land ecosystems and species;

(iv) Increasing data collection and analysis and the dissemination of data on rates of species richness and endemism in different habitats within LFCs in order to assess the global importance for biological diversity of their forests;

(v) The need to discuss more ways for countries to define forest uniqueness;

(vi) The need for LFCs to produce national biodiversity action plans;

(c) Afforestation, reforestation and plantations:

(i) The need for afforestation to meet increasing global fibre demands, especially for pulp and paper and the initiation of such afforestation for environmental reasons on non-forested and degraded lands, which are widely available in many LFCs;

(ii) Governmental and intergovernmental assistance in covering the incremental social and environmental costs of achieving good forest stewardship in plantations;

(iii) Joint implementation schemes for carbon offset, in which markets are now developing that may increase the attractiveness of afforestation on a large scale;

(d) Cooperation and participation:

(i) The need for national forest coordinating and advisory services to introduce partnership mechanisms and coherent incentives for operating in different sectors, and to improve forestry capacity in different authorities and institutions dealing with non-forest land;

(ii) The establishment of mechanisms for consultation and debate among stakeholders so as to facilitate the process of choosing and balancing options and combine scientific information with stakeholder perspectives at the local, national and global levels, in order to improve the flow of information and generation of new ideas and tackle cross-sectoral issues;

(e) Information:

(i) The inadequacy of existing information systems as regards their topic and scope; frequency of data update; land area coverage and type; data quality in terms of accuracy and comparability; and the integration of

the process of information gathering with the purposes for which such information is being gathered;

(ii) The need to encourage recent developments from global to local levels in improving the information available, such as:

a. The wider use of participatory methodologies in order to improve the degree to which information on forest goods and services incorporates the perspectives of local stakeholders;

b. The increased use of global programmes of remote sensing of forest resources so as to incorporate the assessment of land cover other than forests that might provide forest goods and services;

c. The implementation of national monitoring programmes to improve the accuracy of data and the frequency with which they are recorded;

(iii) The need for cross-sectoral information systems that integrate information into a common context and the integration of information capacities that are driven by the forest management and policy processes and do not function as separate activities.

76. The Panel may wish to request its secretariat, in preparing for discussion of programme element I.5 at its third session and for the final consideration at its fourth session, to take into account current and future discussions of other relevant programme elements of its programme of work, as well as government-sponsored initiatives under way in support of the work of the Panel.

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Figure 1a
Numbers of countries in classes of forest cover (% land area)

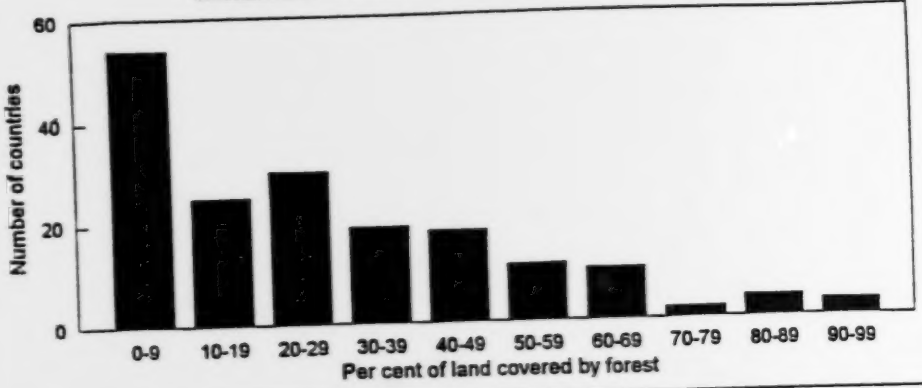

Figure 1b
Numbers of countries in classes of % land covered by forest and other wooded land

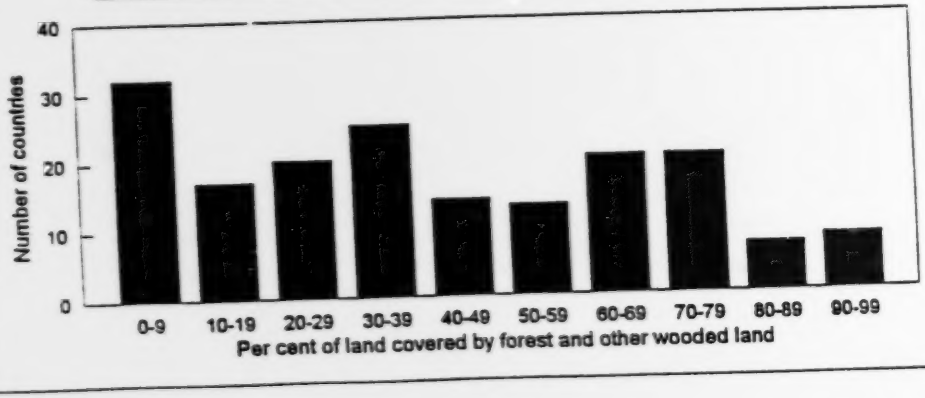

Figure 1c
Numbers of countries in classes of per capita forest cover

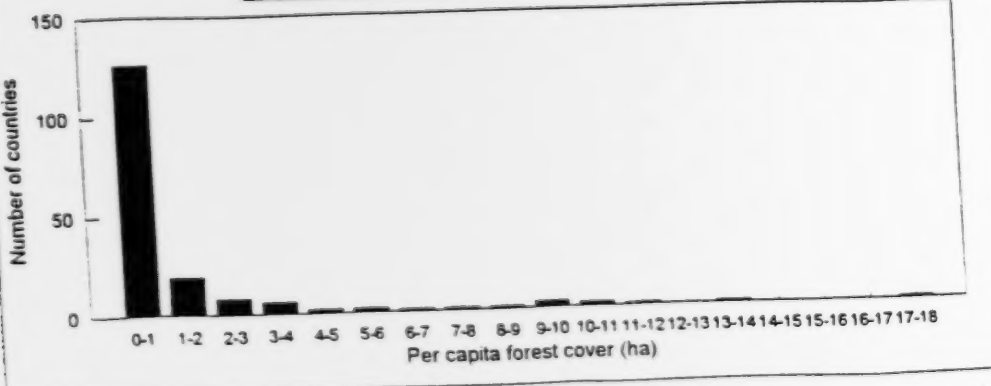

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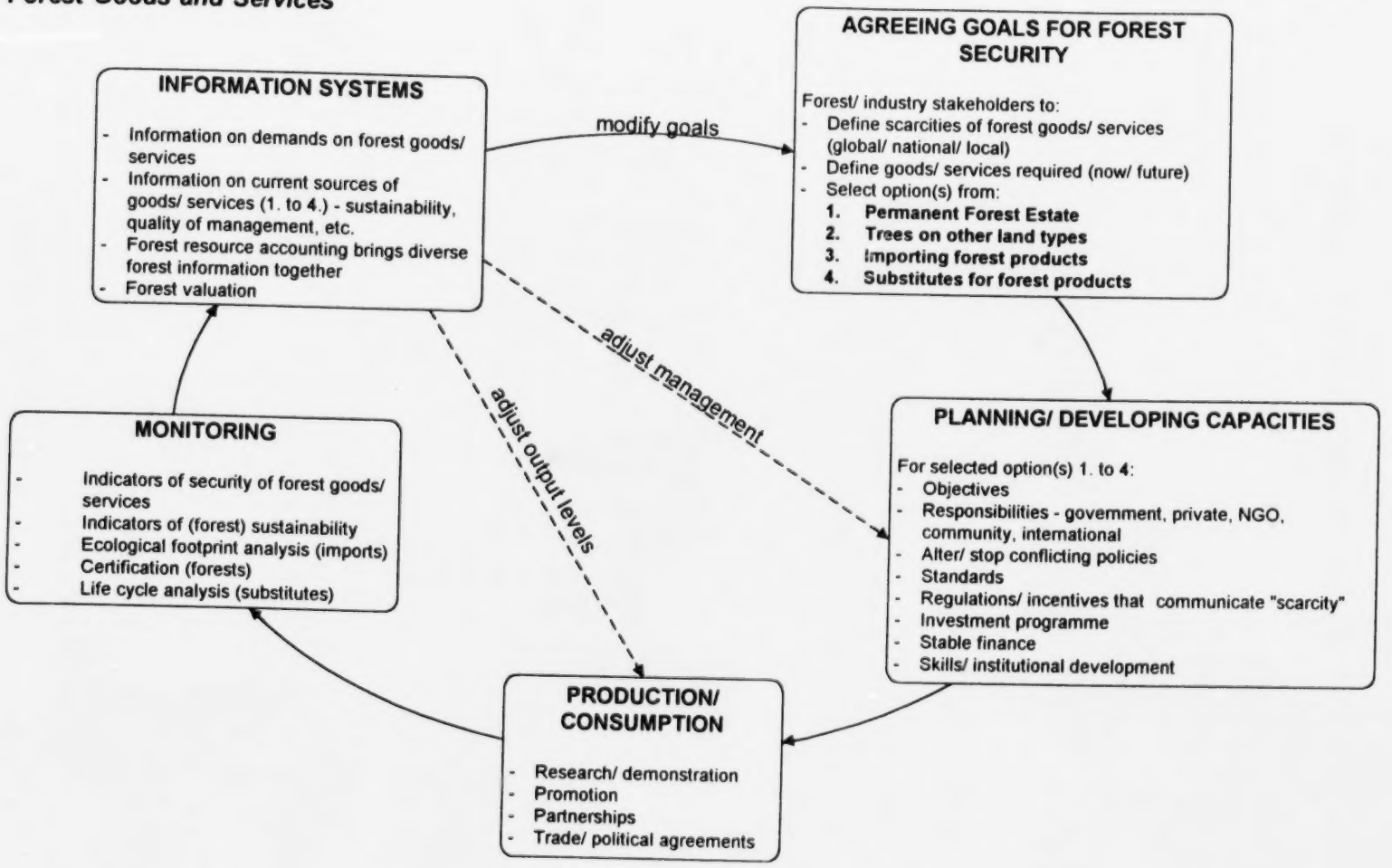
Figure 2
Processes for Achieving Security of Forest Goods and Services


INFORMATION SYSTEMS
- Information on demands on forest goods/ services
- Information on current sources of goods/ services (1. to 4.) - sustainability, quality of management, etc.
- Forest resource accounting brings diverse forest information together
- Forest valuation
modify goals
AGREEING GOALS FOR FOREST SECURITY
Forest/ industry stakeholders to:
- Define scarcities of forest goods/ services (global/ national/ local)
- Define goods/ services required (now/ future)
- Select option(s) from:
1. Permanent Forest Estate
2. Trees on other land types
3. Importing forest products
4. Substitutes for forest products
adjust management
adjust output levels
MONITORING
- Indicators of security of forest goods/ services
- Indicators of (forest) sustainability
- Ecological footprint analysis (imports)
- Certification (forests)
- Life cycle analysis (substitutes)
PLANNING/ DEVELOPING CAPACITIES
For selected option(s) 1. to 4:
- Objectives
- Responsibilities - government, private, NGO, community, international
- Alter/ stop conflicting policies
- Standards
- Regulations/ incentives that communicate "scarcity"
- Investment programme
- Stable finance
- Skills/ institutional development
PRODUCTION/ CONSUMPTION
- Research/ demonstration
- Promotion
- Partnerships
- Trade/ political agreements